

Working Paper

**Impact Of It In The Danish Banking Industry,
With Specific Illustrations From
The Nordea Group and Lån & Spar Bank**

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**Impact Of It In The Danish Banking Industry,
With Specific Illustrations From
The Nordea Group And Lån & Spar Bank**

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**Diffusion and Impacts of the Internet and e-Commerce:
The Case of Denmark
GEC III report**

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ABSTRACT

Danish banks have traditionally been in the absolute forefront globally as regards the automation and introduction of IT since the mid 60'ies. But when the e-commerce opportunities emerged in the late 90'ies, the majority of the Danish banks resisted the development. They saw no reason to be the prime movers in cannibalising their own key competitive advantage, the 2.500+ retail-outlets (branches) placed on all the best locations on corners of the shopping streets¹. However, once pure Internet banks were introduced in 1998 - 2000, all major banks (and the computing centres servicing the smaller banks) launched massive initiatives to bring the brick-and-mortar banks back into the driver seat using Internet banking. At the end of 2003 more than 30% of all Danish bank customers are using Internet.

This development in the banking industry is illustrated using two cases. The first is one of the most ambitious attempts at creating a Nordic based large international financial service company, capable of spearheading the transition to the digital economy - the case of Nordea. This bank is in the midst of various transformation processes across the organisation due to several years of multiple cross boarder mergers and acquisitions, new composition of the group executive management, increasing thrives towards automation of business processes to reduce costs, and different innovations involving a change of the roles of value network partners.

The other case is Lån & Spar Bank, which is one of the smaller Danish banks, who have its basic IT services done at a joint computing centre owned with many other smaller banks, but have its own IT development for strategic purposed done in-house in close collaboration with the business units. This bank has been in the forefront in adopting new IT-solutions.

This report consists of an analysis of the background for the development of the Danish banking sectors, the key processes in the Danish banking industry, the environmental and policy actors influencing the development, the e-commerce readiness in the Danish banking sector, the diffusion of e-commerce, and finally the impact on efficiency, industry structure and competition.

The main results are that there are more Danish financial institutions having Internet technologies and Internet applications than in the other nine countries in the GEC survey. Furthermore, we suspect that they have had it for a longer period on average than found elsewhere in the sample. However, when we compare the figures in the GEC-survey on the 'Use of Internet for the different business processes', and 'On-line support', the number of Danish financial institutions having Internet applications is not higher than in the other countries.

¹ Only a few smaller banks like Lån & Spar bank started experimenting in 1995, when customers conducted 7.700 transactions on-line

Furthermore, when we look at the GEC survey data for the 'Impact of doing business on-line', we see a corresponding picture of more or less the same percent of Danish financial institutions reporting on high positive impacts from using the Internet as we find in the other countries.

If we limit the discussions from all financial institutions to just banks, we believe that Danish banks are in the forefront globally when it comes to the adoption of IT in general and Internet with related technologies in particular. The main reason why this does not show in the figures is one of perception and relative change. Danish banks have had a joint IT-infrastructure for approximately 30 years, and they have worked on improving business processes and self-service for a very long period based on this effective infra-structure which still does not exist as efficiently anywhere else. Consequently, the added value of Internet and related technologies has not been that revolutionary as we find in most other countries.

But this does not mean that Danish banks across the board are trailing behind in the Internet revolution. It is our conclusion in spite of the GEC-survey data looking at the whole financial sector that Danish banks are very much in the forefront globally, when it comes to the use of Internet and related technologies for improving their business processes and self service to the customers. Most of them are past the so-called transaction stage and trading stage. They are now entering the stages of on-line assisted advice to customers and straight through processing (STP) with a total integration of the customer on-line transactions with that of the main systems in the banks e.g. for credit scoring .

1. DANISH BANKING INDUSTRY

The Danish finance industry investigated in the GEC survey included banks, insurance companies, financial advisors and other financial institutions. However, in this paper, we shall concentrate on the banking sector, which in itself is complex enough.

Banks can be classified into three types of institutions, commercial banks catering for industry/commerce, saving banks catering for the household and their savings, and “realkreditinstitutioner” (mortgage banks) providing housing loans for private as well as business.

Over the more than 100 years of existence, the borders between the three types of institutions are getting blurred, and today the differences are clearly diminishing. Almost all retail banks are becoming more like financial supermarkets catering for all types of customers and all types of banking business, drawing upon specialized financial institutions for special tasks. Mortgage banks are approaching retail banks and commercial banks through the establishment of retail banking activities. In the future the difference is likely to disappear. Below we shall concentrate exclusively on the commercial banks and the savings banks – the Danish Retail banking sector.

In the early 70’ies there were approximately 300 savings banks and about 80 commercial banks. This number has been substantially reduced since. In the early 90’ies the two largest banks merged to become Danske Bank, and within less than six months, the third, fourth and sixth largest banks merged to become Unibank. With these moves, Denmark had got two banks, which were large enough to compete with ‘anybody’ in the Nordic region. Since the early 90’ies, the number of banks has decreased every year as shown in table 1 covering the period from 1992 - 2002. This illustrates also the growing concentration and rationalization, which has occurred during the last decade.

Table 1: Figures describing Danish banking sector

	1992	1997	2002
Number of Danish bank head offices	210	191	181
Foreign banks in Denmark	6	15	17
Number of branches of Danish banks	2467	2178	2067
Number of employees in Danish banks	52161	42283	42634

Source: www.finansraadet.dk/fakta+om+finanssektoren#2 (December 2003)

In spite of the large number of banks, the concentration in the finance sector is very high. The two largest banks together have approximately 75% of the total balance, as shown in the following list indicating market share measured on balance:

- Danske Bank 50.5%,
- Nordea (Danish part) has 23.4%,
- Jyske Bank 5.0%,

- FIH 2.8%
- Sydbank 2.8%.

The next 17 banks share 9.8%, and after those follow 71 banks with a total balance of only 5.0% of the market. The remaining 88 banks share just 0.4% of the Danish market.

(<http://www.finansraadet.dk/fakta/>)

Another way of expressing the level of concentration is the so-called CR5 concentration ratio, expressing the market share of the five largest banks in a country. For 1999 the CR5 ratios were Sweden (85), The Netherlands (82), Denmark (81), Belgium (80), Finland (68), Italy (48), France (46), Austria (43), UK (30), Germany (16), and EU average (57). (Konkurrenceredegørelse 2002, Konkurrencestyrelsen, Copenhagen, 2002)

But the number of banks is still absurd high considering a population of only 5.3 million in Denmark. The reasons for the large number of small banks still in existence are primarily the very strong joint institutions supporting all Danish banks, large or small, and the fact that all the small banks are serviced by three large IT-centres.

If we look at the total number of branches, table 1 shows a small reduction over the ten years. This means that the number of inhabitants per branch is going up, and in 2003 the figure is a little over 2500 inhabitants per branch on average. This is a figure just a little lower than the EU average and pretty close to the figures for e.g. France, Germany and The Netherlands.

(<http://www.finansraadet.dk/fakta/>)

The number of employees in the banking sectors has also gone down over the last ten years from around 1% of the total population in 1992 to a little less than 0.8%, which is pretty much the average in the EU. This could indicate that there are little differences between the banking systems. However, it is our opinion (supported by different representatives from the Danish banking industry) that there is a much higher level of automation in Northern Europe, a higher % of customers serving themselves, and a much larger variety of banking services offered by banks in these countries than in Southern Europe.

2. EARLY IT SYSTEMS FOR THE FULL BANKING SECTOR

In the first decades after the Second World War, a number of joint banking institutions were established in Denmark. These were aimed at increasing efficiency in a banking sector with far too many small players by providing a joint system for every bank to use. A major reason was that if such systems were developed, it would be possible even for very small banks to avail themselves of them paying only a fraction of the costs compared to if the banks should have developed the systems themselves. A second reason was that none of the banks at that time could establish such an infrastructure even just for themselves.

Compared to other countries, Denmark has an exceptional well developed IT-infrastructure for all banks. Good examples of such joint systems for the entire Danish banking sector including subsidiaries of foreign banks are:

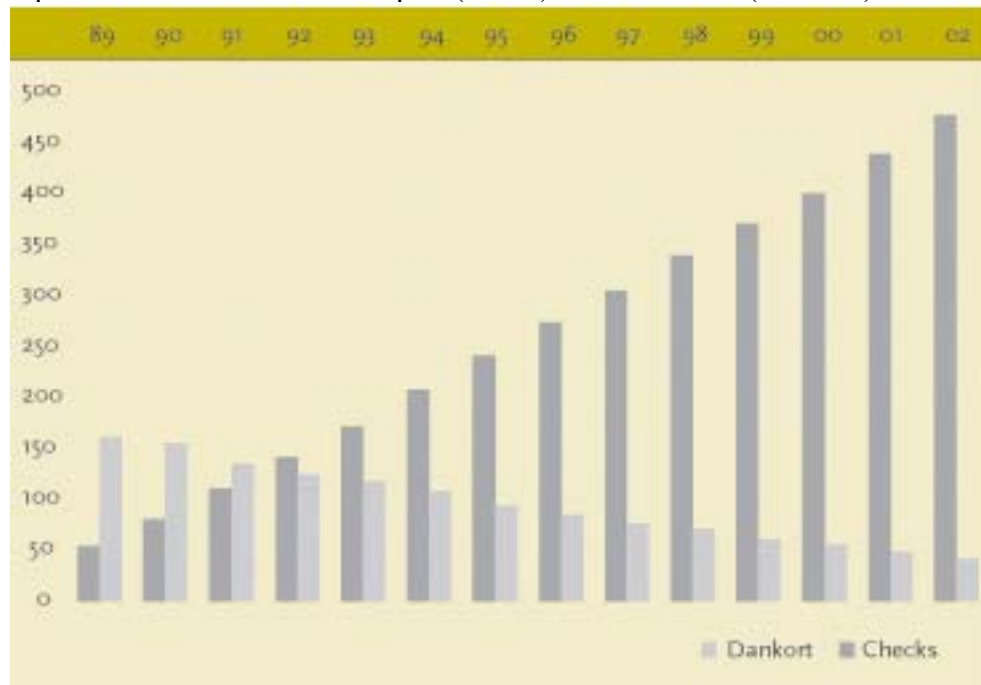
- PBS from 1970/71. This organization was created to handle all transfers of funds between the banks electronically. This was especially important for cheque clearing, which became totally electronic from the early 1980. This means that the bank who receives the cheque keeps the physical paper, and the full clearing is done electronically
- Multiløn (joint salary system) created in 1969 to facilitate payment of monthly salaries from the bank of the employer to the banks of all the employees.
- Swift, the European network between banks first established in 1977
- VP (Værdipapircentralen). After a slow start and a lot of political debate over almost five years, the VP Securities Services Company was established in 1981 in order to electronically handle all transactions in bonds and shares. From 1983 bonds were transferred from paper and in 1988 after a lot of reluctance on behalf of Danish businesses fearing “big brother” interventions, all shares were transferred to the system. As far as we know, Denmark was the first country in the world where all securities were stored and traded electronically. From that time, banks and dealers would integrate their systems directly into VP systems for the execution of the trading and the operation of the database with all Danish securities.
- In the late 1980's all Danish banks agreed on a joint standard for exchange of data, the so-called UDUS standard (Schou, 1995) and the development of the PI-net in order that everybody could communicate with everybody else
- PKK from 1981, which was established to launch and manage a national debit-card for all adult Danish inhabitants. The debit card (Dankort) came into existence in 1983. Since a debit card transaction would cost less than 10% of a cheque transaction, the purpose was to get Danes to use the debit card instead of cheques for all payments except small purchases where cash would be used. The debit card has been an overwhelming success as shown in figure 1. In 2002 3.3 million Danes conducted 477 million debit card transactions, i.e. more than 145/card. For the same year, the number of cheques has fallen to 16/year per person. At the same time, the average amount on a debit card transaction has fallen to approximately 45 Euro, while the average amount for cheques have gone up to 227 Euro (<http://www.finansraadet.dk/fakta/>). Furthermore, it is interesting to note that there are about five times as many debit card transactions as there are credit card transactions in spite of the fact that most Danes do not pay anything for the 4 – 5 weeks credit on a credit card.

An illustration of the infrastructure is found in Appendix 1, which shows that all basic computing is done in six computing centres². The figure shows how ‘all’ shops in Denmark through the use of POS systems are linked directly to the joint PBS clearing house. When a consumer makes a debit-card transaction in the shop, the data goes to PBS, from where the data are sent to the IT-system of the customer's bank to be withdrawn from the account of the customer. At the same time, the amount is placed on the account of the shop in the IT-system of the shop. This is all done automatically in real-time. All ATM transactions go first to the IT-system of the bank owning the ATM and from there immediately to PBS for redistribution. Finally Internet-bank

² In actual fact, two of the three largest banks have outsourced the operations of their IT-centres to IT Facility management companies like IBM and CSC, but conceptually/logically their computing should be seen as being their own IT-function.

transactions and Interactive Voice Response (IVR) goes directly to the IT-centres of the banks, and from there to PBS as illustrated using the Lån & Spar Bank as an illustration.

Figure 1: Development in the number of cheques (check) and debit card (Dankort) transactions in



Source: <http://www.finansraadet.dk/fakta/> (December 2003)

- ATM's from 1984. Initially, unions resisted the introduction of ATM's, and were supported by government. Accordingly, the widespread diffusion came later than in most other advanced IT-countries, but when they were finally launched, all ATM's outside the branches were part of a joint system, i.e. no matter which bank had issued the debit card, cash can be withdrawn cash from any ATM in the country

Over and above these systems for all of the banks including foreign banks, joint-computing centres for a range of banks have been in existence since the 60'ies. Especially the joint computing centre for all savings banks (SDC) has played a major role just like two computing centres owned and operated jointly by the smaller and mid size commercial banks. These three joint computing centres have managed to provide state-of-art computing for their owners (even though some commentators believe that two of them are now lacking behind in the provision of state-of-art solutions – Børsen 8th December 2003). But the third one, SDC has even developed the 'Core Bank' system launched in 1998, which for several years has been the prime banking application package sold by IBM. For the last few years responsibility for development and marketing of the system is in the hands of Fidelity, a US based SW-vendor. Currently this seems to be one of the most advanced banking systems globally.

But the existence of these three joint computing centres has also meant that it has been possible for a very small bank to stay in business. All computing was outsourced, and it was possible to

utilize all the standard systems like electronic funds transfer and securities administration. Last but not least the customers in the small bank could have the full benefit of the debit-card system, have access to cash withdrawal from several thousand ATM's across the whole country, utilize the full banking infrastructure.

These joint sector benefits to smaller banks were even extended to pure Internet based banks appearing in the late 90'ies. These could also avail themselves of all the joint institutions. As a board member of Basis Bank (one of the most highly profiled Internet banks explained in 2001), "the initial investment in getting access to all the joint services including a state-of-the-art banking computing system was less than 1 million Euro" (CEO of Icelandic Banken 2001).

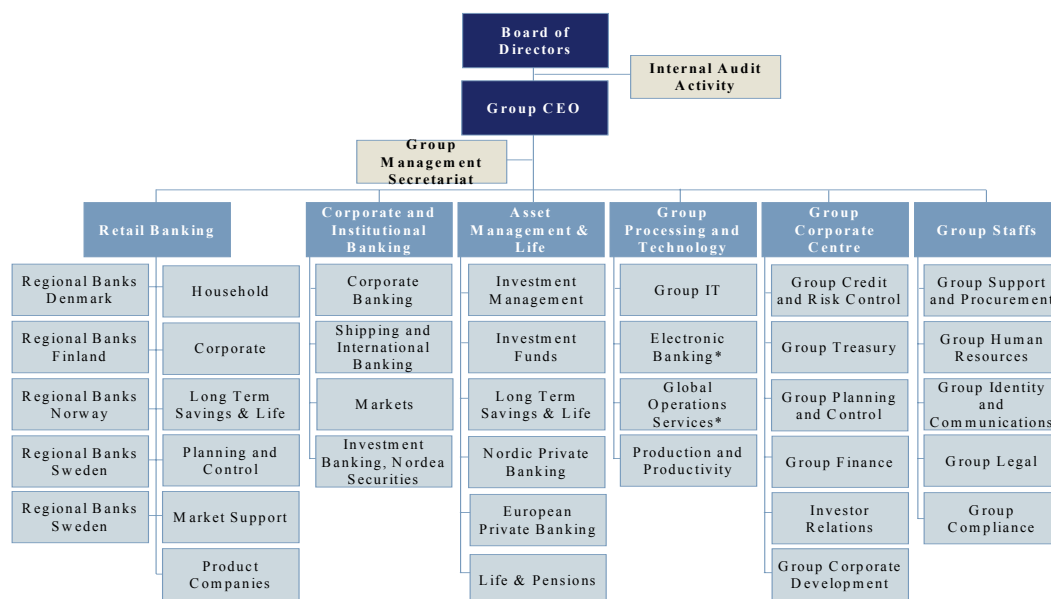
3. KEY PROCESSES IN THE VALUE CHAIN

To get an impression of the Danish banking scene, and the key processes in the value chain, it could be useful to look a little closer at the case of Nordea (short for Nordic Ideas), the largest bank in the Nordic countries, and the second largest in Denmark.

A brief historic outline of the Nordea Group reveals an ongoing process of mergers and acquisitions. The merger of the two groups MeritaNordbanken and Unidanmark (parent company of Unibank) resulted in the creation of the Nordea Group in March 2000. In 2002 this was the largest financial services group in the Nordic and Baltic region. The group is listed on the stock exchange in Copenhagen, Helsinki and Stockholm, and had a market capitalisation of EUR 15.6bn at that time.

Nordea has significant positions in Nordic banking markets, i.e. 40 per cent market share in Finland, 25 per cent in Denmark, 20 per cent in Sweden and 15 per cent in Norway. Also, in the Nordic insurance market Nordea has significant positions.

Figure 2: The organisational chart of the Nordea Group



One might get an idea about the key processes in a large financial supermarket like Nordea by looking at the organizational chart shown in figure 2, where one can notice the separate but joint function of Electronic Banking placed as one of the Group Processing and Technology departments.

Nordea operates in three business areas: Retail Banking, Corporate & Institutional Banking, and Asset Management & Life. Each business area is responsible for financial results, customer relations, distribution, products and business development and support. In 2001 the revenue split between the different business areas was approximately: Retail Banking 71%, CIB 21%, and Asset Management (including Life and General Insurance) 8%.

Nordea has three vital support functions, i.e.

- *Group Processing and Technology* includes Group IT, Electronic Banking, Global Operations Services and Production and Productivity.
- *Group Corporate Centre* includes Group Credit and Risk Control, Group Treasury, Group Planning and Control, Group Finance, Investor Relations and Group Corporate Development.
- *Group Staffs* includes Group Support and Procurement, Group Human Resources, Group Identity and Communications, Group Legal and Group Compliance.

Nordea has a customer base containing 9.7 million private customers, 1 million corporate customers and 500 large corporate customers. The distribution network of Nordea is the most comprehensive in the region entailing 1,245 bank branch offices in 22 countries, and 40,000 employees.

On their website, the Nordea bank is stating their policy in the following way:

Being a universal bank and bank assurer, Nordea offers a broad range of financial solutions and advisory services, focusing on opportunities for cross selling and up-selling. The role of branch offices is changing into focused service, advisory centres and sales offices along with the intensified use of the Internet, call centres and mobile banking. Nordea is and aims to remain a world e-leader in e-based financial solutions.

We have chosen to site this quote in order to indicate to key importance that the Nordea bank is attaching to the Internet and e-banking, and even though the Danish part of Nordea is not the most advanced in the group, the Nordea Bank has one of the largest total number of on-line customers with its 3.3 million on-line at end of 2003.

Another example of advanced use of IT is the small bank called Lån & Spar.

In the late 1980'es a recession was going on in Denmark, and the 6 biggest banks decided to merge into the 2 megabanks Danske Bank and Unibank, a small bank called Lån & Spar Bank decided to do it on its own.

With only 15.000 customers and ranking as bank no. 42 in the country, the future was quite challenging. However, Lån & Spar decided to develop the rather new concept of a 'Direct Bank' for private customers building on a high exploitation of technology, since it did not have a huge branch system. (CRIM, London Business School, Lån & Spar Bank A/S: Building a Direct Bank. Case A+B Michael Earl).

Launching two new concepts at the same time – a direct concept offering some PC-banking services at attractive prices and a service concept offered through the branch system, attracted a lot of new customers.

Being a member of Savings Banks Data Centre (SDC), L&S had outsourced its basic IT with mass transactions to SDC, but at the same time L&S hired programmers to offer private customers electronically advice and later on more complex transactions.

Part of the strategy was customer segmentation. Not only did the bank exclude all corporate customers, but it also decided to make the bank especially attractive to white collar workers and academics. (Markides, Costas: All the right moves. HBSP 2001).

In 1992/93 Lån & Spar Bank launched the first advice applications on diskettes. Budget programmes, tax calculations, price comparisons, fee comparisons etc. From 1995 the applications were launched on CD ROMs. Up to now the bank has issued more than 1 million diskettes and CD ROMs for free to the Danish population.

In 1993 the bank took the initiative to launch the first real-time, online PC Bank in the world. They enabled their customers to access their accounts directly at the data centre (SDC) doing banking business on their own.

In 1997/98 Lån & Spar Bank together with two other members of the data centre launched the first full-service Internet bank in Denmark, the so-called Lån & Spar Nextbank. They were technically able to do this earlier, but the numbers of Danes having access to the Internet were rather limited at that time. In actual fact, Internet banking became one of the biggest drives to attract people to the Internet.

L&S has continued its focus on electronic services to the customers. Since 1993 it offered a public accessible chat room open to all its customers. Initially it was offered as a Bulletin Board, and since late 1995 it was offered directly on the Internet. In the year 2000 the bank introduced a B2E (Business-to-Employee) virtual bank concept, where L&S offers a co branded banking solution for employers and trade-unions, carrying the name of the employer or trade-union in question, but basing all on the L&S banking solutions.

Today Lån & Spar Bank is ranked as no. 12 in Denmark with app. 150.000 customers still pursuing differentiation by tailoring their services on top of the outsourced mass transaction system. Lån & Spar Bank offer services through 15 branches and 25 co branded virtual banks.

4. KEY ENVIRONMENTAL AND POLICY FACTORS INFLUENCING THE DIFFUSION AND IMPACT OF E-COMMERCE

Danish banks were in the forefront internationally as regards using IT from the mid 1960s. For example it could be mentioned that the first on-line, real-time system with cashier terminals in the branches was introduced as early as in 1969. In this process as in almost all other IT innovations in the 60'ies and 70'ies, IBM played a strong role in motivating the use and adoption of IT, and in many cases Danish banks were guinea pigs for new applications. For several decades IBM had a market share of IT to Danish banks of more than 60%, much more than in other countries.

The most important reasons for this early adoption/automation had to do with having a fairly tightly controlled banking systems (restricting competition), relatively high salaries of employees (among the three highest in Europe making automation relatively more attractive), shortage of labour in many years, and a relatively high level of education enabling the development and introduction of new IT.

The high level of unionisation in the banking sector (>90%) was a major factor influencing computerization. In the late 70'ies unions resisted the introduction of new technology due to risk of lay-offs and risks of demeaning of jobs. However, after technology agreements had been established between unions and management in the banks in the late 70'ies, and after the initial distrust had prevailed for a couple of years, the unions became a trusted partner in the introduction and diffusion of new banking applications. Unions among other things were strong supporters of joint banking solutions, and since they had good links to government, there was a societal pressure for the banks to join forces e.g. in sharing the ATM's rather than each establishing their own ATM infrastructure.

Government also contributed to making computerization almost mandatory through the introduction of a number of requirements. These included a so-called "additional labour market pension" (forcing all employers to keep track of the collection and transfer of these small amounts), the introduction of 'pay-as-you-earn-tax' in 1970, and requirements on banks to report interests earned and paid by all citizens for tax-declaration purposes. These requirements made it necessary for every salary earner to have a bank account where salary after tax is deposited. But the government also facilitated computerization through the introduction of the personal ID number, making it rather easy to identify customers across accounts.

Furthermore, the government restrictions on lending (to avoid overheating of the economy from 1970 to 1980) and from the mid 70'ies on maximum interest margin, strongly reduced competition among banks to a question of offering (free) services including the number of banking outlets. This strongly regulated banking market also furthered the establishment of a joint infrastructure and collaboration between the banks, but it was also a strong inducement for increased automation.

From the early 90'ies, banks in Denmark started offering PC-solutions for B2B as well as B2C customers, and towards the end of the 90'ies, all banks in Denmark were offering and strongly promoting the use of Internet-based banking.

The CRITO Global survey in tables 9 – 11 in the main report provides an overview of the key drivers for e-commerce as reported by the financial institutions surveyed³. Looking especially at the figures in table 11 specifying the drivers for the finance sector, we find that no less than half of the Danish financial institutions mention cost reduction as a key driver. This is especially interesting compared with the similar figures for Germany and France, where less than a quarter of the institutions mention this driver. Other key drivers mentioned by 40 – 50% of the financial institutions were “coordination/communication with customers”, “that customers demand it”, to “expand the market for existing products”, to “enter new businesses or markets” and last but not least “because customers demand it”. Again for all of these drivers, it is interesting to note that there are approximately twice as many Danish financial institutions mentioning these drivers than we see for German and French institutions.

The fact that about half of the financial institutions surveyed indicated that “customers demand it” and that “major competitors were online” as key drivers is interesting, because it underscores that in the early days of Internet-banking, most of the banks were not too keen on embarking upon Internet-based banking. This pressure from the market is interesting, and we believe a reflection of the marketing efforts and the relative success of pure Internet banks. The brick-and-mortar banks already had huge investments in branches on the most attractive locations, i.e. on the corners of the shopping streets and in the shopping centres. This was their competitive advantage, which had been established over a period of over one hundred years. Accordingly, the established banks did not welcome the advent of pure Internet banks. Of course they wanted to reduce their own costs by providing their customers with self-service facilities, but they saw no reason why they should ‘teach’ the customers to use Internet rather than the branches, which provided them with a competitive advantage.

It was only when the traditional banks were threatened by what in the early days looked as a huge rallying behind pure Internet banks that they put turbo on their development of Internet applications for customers.

The Internet banks received a lot of press in 1999 and 2000, but since then the brick-and-mortar were capable of meeting the challenge and coming up with similar Internet based solutions, and since it turned out that bank customers were much more loyal than almost everybody believed, (customers are even prepared to pay a premium fee and/or higher interest for having a traditional bank) a major shift to pure Internet banks did not occur.

³ Please note here that the GEC survey is a representative survey of all institutions in the finance sector, not just banks. As such this could account for some of the differences which are not easily explained. However, great care has been taken to avoid any systematic difference in the way the Danish sample has been selected compared to the way it has been selected in the other countries.

5. E-COMMERCE READINESS

For the traditional banks, the question of providing e-banking was primarily a question of the IT architecture and IT applications. Only to a limited extent was it a question of changing business processes, training staff etc.

If we look at the IT-status in the six IT-centres (the three owned by the largest four banks plus the three joint centres serving groups of smaller banks shown in Appendix 1), there was a relatively high level of flexibility and agility to meet this new challenge. Among these, Danske Bank and SDC have integrated state-of-the-art architectures and customer interfaces, (e.g. all accounts and all other relationships with a customer were integrated into one consolidated overview) and these two IT-functions could relatively quickly provide Internet solutions.

However, the IT situation in Nordea was much more challenging. This is mainly a consequence of the many mergers and acquisitions where a joint IT infra-structure had not been enforced as we see in e.g. Danske Bank, where every time they merged with another bank, they rolled out the Danske Bank solutions in that bank. This situation in Nordea is still a huge challenge when the ambition is to provide state-of-the-art on-line solutions to the consumers.

For Lån & Spar Bank the situation to some extent is much easier. They get their basic IT-services from the joint computing centre SDC, primarily handling all mass transactions, and they have a leading role in deciding the actual development on IT-solutions in SDC. Especially the three largest shareholders of SDC, Spar Nord Bank, Amtssparekassen Fyn, and Lån & Spar Bank have all contributed to the IT development for the last 8-10 years. Amtssparekassen Fyn played a key role in the development of a totally new 'Core Banking System' launched in 1998, which today is capable of providing state-of-the-art banking services. For several years this was the banking application sold by IBM as their standard application, but sales/support of the package has now been transferred to a US-based company called Fidelity Information Services, Inc.

Spar Nord Bank and Lån & Spar Bank on the other hand were the key drivers in developing self-service for the customers. Lån & Spar Bank, especially, has for years worked with a strategic driven IT development. One might say that L&S is developing the banks business strategy with a strong focus on the IT, or that the IT strategy is a consequence of the bank's corporate strategy. At any rate, it is the corporate strategy of L&S to move from early stages of e-business to a stage where e-business is totally integrated into the business strategies.

6. DIFFUSION OF E-COMMERCE IN 2003

The financial sector has been aggressive in using e-commerce as a strategic tool and as a means of reducing processing costs. From 1999 to 2000, the numbers of customers using Internet to complete banking transactions doubled (Ministry of Information Technology and Research 2000), and there has been a strong growth to around one third of all customers using e-banking in 2003.

All Danish banks pursue a Multi-Channel strategy, where customers can combine their use of channels and select the most convenient channel at any given moment. High accessibility, integration and efficient business processes in all channels, is seen as one of the most important means to provide services that meet customer's expectations and ensure the highest level of customer satisfaction.

The tremendous change in the way in which basic bank transactions are carried out is illustrated in table 2 showing the changes in the number of transactions using the different challenges. It is especially worth noting the tremendous relative drop in number of cashier generated transactions since the mid 90'ies where it was 46.5% to a situation in November of 2003, where it only accounts for a meagre 6.8%. This is counteracted by the similar increase in the number on on-line transactions which have gone from 0.9% in September of 1994 to close to half at the end of 2003.

	September 94		June 1997		November 2003	
	Number	%	Number	%	Number	%
Cashier transactions	398,000	46.4	408,000	29.2	200,000	6.8
Payment systems EFT	53,163	6.2	102,727	7.4	161,304	5.6
ATM transactions	37,345	4.4	55,592	4.0	67,719	2.3
Interact. Voice Resp.	60,440	7.0	100,480	7.2	75,576	2.6
Debit card transaction	301,655	35.1	592,929	42.5	1,082,016	37.0
On-line banking	7,627	0.9	134,900	9.7	1,334,446	45.7

Table 2: Monthly number of transactions generated using the six different modes of interaction in the Lån & Spar Bank

We do not have comparable figures for the banks in the CRITO sample, but the figures are put into perspective by a report from Forrester (2003), which indicate the % of transactions in 2003 (excluding debit card transactions) in a typical European bank as ATM (52%), Cashier (26%), On-line (17%), Call Centre (5%). Indeed the difference is huge. In the same report, Forrester is estimating that the typical European bank will not have on-line transactions reach the same percentage level as L&S bank until 2009. Danish banks seem to have adopted a 'right-channelling' approach, and in the words of Forrester: "The efficiency gap between the right-channelling leaders and the laggards will widen as highly leverage able electronic channels substitute for human channels. The leaders .. will be able to post disproportionate gains in customer service and transactional efficiency ... (as found with) right-channelling masters like Danske Bank" (Forrester 2003 p 11)

If we look at the number of financial institutions offering on-line services, account info and on-line tools as reported in appendices p.10 of the main report, it is clear that the number of financial institutions offering these services on-line in Denmark, is only on par with the average in the global sample, and clearly behind the US, Brazil, and the four Asian countries. We do not have a good explanation for this.

However, if one looks at the potential ways of using Internet and related technologies for banking applications, it is possible to identify four levels of ambitions:

- Transaction stage – customer is him/herself handling payments and transfers from own account to others, and to a large extent debit and credits to his/her account takes place using EFT. This has been in place for all Danish banks since 2000. What is still lacking is to make all customers serve themselves and not just one – two thirds of them, as we see today.
- Trading stage – here the customer will buy and sell stocks/shares electronically. Systems for this is also now in place in all banks in Denmark, and in a handful of pure Internet-businesses, but since there is not a culture for owning shares in Denmark like in Sweden or the US, this does not have the same widespread adoption in Denmark.
- Advice stage – portal solutions where customers can ask financial advice e.g. when buying a house, and where the customer and the bank clerk see the same screen. This is still not technically possible in most Danish banks. Customers have their (often much more fancy and newer interface), while bank clerks have more traditional interface systems build as interfaces directly on top of the transaction systems. These systems are likely to come into effect 2004/2005
- Straight Through Processing (STP) stage based on automatic behavioural and credit scoring models will be in place 2005/2006

As indicated above, Danish banks have a long tradition of being in the forefront globally when it comes to the adoption of IT. However, if we look at one of the two large banks, we get a different picture. If we again focus on Nordea, they offer a variety of eBusiness solutions to their B2C as well as their B2B customers. Some of the most important examples are presented below:

E-payment and Solo Market. Net customers can make secure online purchases using e-payment. In 2002 Nordea had over 1,800 e-payment agreements with vendors who accept e-payment and more than 600 are represented at the electronic marketplace Solo Market, accessible from the national web site in Denmark, Finland, Norway and Sweden. Online buyers thus have convenient access to a wide range of goods and services - including customers using WAP and GPRS phones.

For e-commerce vendors, net customers are an ideal target group, sufficiently large in number, with modern attitudes and purchasing power, familiar with online operations. By accepting e-payments, vendors eliminate invoicing and credit risks. This is particularly important with a large number of small transactions.

Furthermore, via Solo Market, vendors get access to buyers in market places in Denmark, Finland, Norway and Sweden. Nordea's local home pages (www.nordea.dk, www.nordea.fi, www.nordea.no and www.nordea.se) have become important portals, as online customer typically visits the e-banking services 4 to 5 times on average a month via these portals.

E-invoice. E-invoice is a kind of semi-direct debit - an e-invoice sent to the customer's or buyer's computer rather than printed on paper. A company that uses online invoicing saves on postage costs and can provide better service in an interactive online customer relationship. A customer using e-invoice can receive an invoice directly to his computer, and approve payment without having to retype the details. Via this online invoice, the customer can also link to the online service of the vendor in order to obtain more information. The main emphasis has been put on consumer invoicing. B-2-B invoicing is going to be the next step.

E-identification and E-signature. Many enterprises and public sector institutions need to be able to identify their online customers/clients. As early as 1992 the insurance companies in Finland began to use bank delivered e-identification. In dealing with authorities, this service can be used for example to send information to the corporate register maintained by the National Board of Patents and Registration of Trademarks. Net customers can also sign agreements with third parties using their electronic IDs as a signature. There is also significant potential for an electronic signature of contracts. Since April of 2003 e-signature has been available in Denmark, but at the end of 2003, the uptake is still far from 10% of the population.

E-salary. E-salary is a service designed to enable employees to browse through their monthly salary data electronically via e-Banking services. Thus, the sending of a pay slip on paper will no longer be necessary. A substantial benefit is also that the pay slip details are saved in files thereby providing the user access to earlier salary data.

Another similar innovation has been the launch of **e-box** in March of 2001 jointly owned by the Danish Post, DM-data and Kommunedata (Joint-computing centre for municipalities and regions). The idea here is to avoid sending invoices, account statements etc to consumers and instead send the documents to a joint database, from where the consumers can download it but also store it forever. For the consumer there are no costs involved in maintaining an account, and it is even possible to store electronic versions of private documents (birth- or marriage certificates, deeds etc) in a safe place. For the sender (public institutions, utilities, banks and others who send millions of letters every day) this represents a huge saving, since they do not have to pay postage or print material. Furthermore, the consumers would always be able to find copies of old statements, and there would not be a need to send out copies to people who have lost documents. After a slow start, and after a lot of advertising including the sponsoring of one of the most popular national teams, this has taken off, and at the end of 2003 there are around 250.000 consumers who have (a part of) their formal communication with public/private institutions including bank statements stored here.

CoinClick (www.coinclick.dk) is a micro-payment system allowing service providers to charge for small amounts in a very easy, secure way. It was developed and launched in August 2002 by the two largest banks in Denmark, i.e. Danske Bank and Nordea, in corporation with the association of regional banks, the electronic payment processing company PBS, and the largest Danish telecom operator TDC (Tele Denmark Communication). Among them these organisations have 1.5 million Internet bank customers and 1.9 million users of mobile services.

CoinClick is an Internet account - a type of 'web wallet' – for the payment of small sums ranging from approximately 8 cents to 8 Euro. Users can establish an account on Coin Click's home page or via their net bank. By using CoinClick customers can easily pay for digital services (music files, invoices, financial advice and sports news, etc. using Internet and mobile phones.

CoinClick offers two types of accounts: Payment in advance and payment in arrears. While the former is free, payment in arrears accounts cost only one DKK (app 0.134 Euro) per month for the buyer. For vendors, fees depend on sales volume, but will typically be around 10%.

The take up of CoinClick has been very slow compared to expectations and original business plans. The number of registered users has gone up from 250.000 in 2002 to 300.000 in 2003, and the number of vendors has increased to 13 by the end of 2003. However the actual number of transactions is still disappointingly low and the turnover is less than 100.000 Euro/year. It seems to be beyond a shadow of doubt that the only way to make money selling content on Internet is on a subscription basis. In actual fact, the uptake has been so low that the banks are contemplating closing the system.

Identrus™ LLC and SWIFT on TrustAct. Identrus is a provider of global e-commerce trust systems that delivers validation and warranty protection for B2B e-Commerce.

SWIFT (www.swift.com) and Identrus™ LLC (www.identrus.com) have entered into an alliance to offer a joint solution to facilitate business-to-business (B2B) trusted communication and give financial institutions. Based on Identrus' identity trust services and Swift's messaging capability, financial institutions all over the world can help their corporate customers identify trading partners, trust their communications implicitly and protect themselves in the event of a dispute.

Swift's Internet-based messaging service, TrustAct, enables banks to provide secure delivery and receipt of messages that businesses exchange on the Internet. In addition, TrustAct keeps a log of business-to-corporate business messages and provides full non-repudiation. This non-repudiable evidence, together with the Identrus system non-repudiation of digital signatures, is essential for audit trails or dispute resolution.

In June 2002, Nordea agreed with the e-market place for the forest industry, PapiNet (www.papinet.org), to use TrustAct. Hereby, Nordea integrates banking into e-business flows of the global forest industry. PapiNet was initiated by the forest industry to facilitate standards of communication and commerce.

PapiNet is the global initiative to develop, maintain and promote the implementation of global electronic transaction standards for the paper industry. The purpose is to facilitate the flow of information and facilitate computer-to-computer communications among all parties engaged in the buying, selling, and distribution of forest, paper and wood products. The set of standards is referred to as the PapiNet standard. The standards include common terminology and standard business documents (e.g. purchase orders, shipping notices, and invoices).

Nordea and PapiNet have modelled a solution to integrate security and banking services into the business-process messaging of the global paper industry. The joint solution provides cost reduction potential for PapiNet members due to integrated financial and business-process messaging, simplified dispute resolution and global Internet-initiated payments provided by the banks of their choice. The solution builds on Identrus PKI security and Swift's TrustAct messaging infrastructure. It covers the entire value chain from order to settlement.

The various e-business initiatives for Nordea have proven to be a large success as illustrated in the following numbers for 2002:

- 3.300.000 e-customers of the 9.7 million private customers (34%)
- 110 million Internet log-on per year
- 125 million Internet payments per year
- 5+ million calls per month – and 85% of the calls stay in the IVR

With its more than three million Internet users mid 2002, the Nordic Nordea bank, which covers all of Scandinavia, has approximately the same number of Internet users as Bank of America, but has more Internet transactions than any other bank in the world including Bank of America. (Interview with e-Business director Jens Galatius Nov. 2002)

Also, the numbers show that Nordea is well ahead in the transformation from a traditional bank to a click-and-mortar bank.

One of the most interesting future challenges lays in mobile payments systems where there are potential new entrants to the market for payment systems, e.g. the Telco's. To address this issue and assist banks, an international forum has been created. Mobey Forum is a global, financial industry-driven forum with over 30 members. Mobey Forum's mission is to encourage the use of mobile technology in financial services. Nordea is one of the founders of Mobey Forum. The common denominator for all Mobey Forum members is their commitment to accelerating the take-off of user-friendly mobile financial services by promoting open, non-proprietary technology standards for services like payment, remote banking and brokerage.

Nordea believes that mobile net-terminals will play an increasing role because it is personal and trusted. Everyone will have a terminal, it is always ready at hand, and with the advent of 3 G UTMS networks, it is always on. It will eventually be connected to the Internet - all the time. It can be a card reader for one-hand operated e-bank-logons and card payments. Blue tooth and similar technology make it ideal for machine-to-machine interaction.

There is divergence of opinions on Telco's future interest in, and ability to provide efficient payment services in competition with banks. Never the less, it is an increasing threat for banks that value network partners as Telco's previously only providing all types of communication access, etc. now are engaging in providing payment solutions to customers – a threat that is not only prevailing on the B2C market, but also on the B2B market.

Payment methods related to mobile phones can broadly be classified into two categories: e-money (pre-paid cards as well as network-based electronic money) and "conventional" electronic

payment systems (e.g. bank accounts transfers) through wireless access, where new electronic access to otherwise conventional payment mechanisms is provided. Payments by mobile phone further contribute to blurring the distinctions between the participants in payment systems (banks, non-bank financial institutions, telephone companies, Internet access providers), cf. Arbussá (2000).

To conclude, although nowadays banks continue to be at the centre of the retail payments system in Europe, the role of financial intermediaries in the provision of payments systems is changing. Since electronic payment technologies require large fixed investments and often networks that exhibit significant economies of scale, we are witnessing a process of alliances among firms that intervene in payment systems. These alliances are not confined to banks or other financial institutions, but include technology vendors and telecom operators as major participants.

7. IMPACT ON EFFICIENCY, INDUSTRY STRUCTURE AND COMPETITION

As regards the impact on industry structure, the two large banks in Denmark (Danske Bank and Nordea) are still supporting most of the joint banking system for all banks in the country including the joint debit card (Dankort) based on magnetic-stripe technology, and all banks in Denmark have also joined forces to launch a chip-based Dankort by mid 2004. The fact that all banks in Denmark share a common infrastructure for many banking applications (Dankort, ETF, securities etc.) makes it extraordinarily inexpensive for new players to enter the market.

Furthermore, the joint infrastructure for the whole industry, and the joint development of e-commerce/e-business applications for the smaller banks are two strong factors mitigating against major changes in the industry structure (first and foremost mergers) in spite of the very large technology related economics of scale.

Increased price transparency has often been hailed as one of the key effects of Internet. It has been argued that customers are now in a much better position to compare prices of the different banks on services such as loans, securities and deposit interests. Indeed that is the case, even though banks in general try to avoid price comparisons and direct price competition. The fact is that customers only to a very limited extent have used this transparency to get better deals or to change to pure Internet banks. Brand (and bank) loyalty seems to be very high, and the few pure players have only got less than 5% of the customers, even after a massive advertising campaign both off-line and on-line. A major contributing factor to customers not changing to Internet banks has been that the same services are available from the brick-and-mortar banks.

If we look at the business impact of doing business on-line for the individual banks, we can turn to the results of the GEC-survey reported in appendices 2 and 3. Here we have provided the figures for the percent of companies indicating impacts of doing business on-line in the ten countries for the small finance and large finance institutions respectively. It is characteristic that the Danish financial institutions (including banks, insurance and other financial institutions) have not been able to harvest the benefits to the same extent as financial institutions in the other countries participating in the international survey.

Accordingly, the overall picture is not very positive for Danish financial institutions. In the survey we have identified ten largely positive dimensions for impacts of doing on-line business, and although it is meaningless to calculate an average of the ten dimensions, it is clear that only around a third of all finance institutions surveyed have reported such positive impacts on the ten different dimensions.

In order to analyse the data a little further, the percent of Danish institutions which have reported an impact on the individual dimensions are shown in the table 3, where the dimensions are organized in descending order. It is noteworthy that the largest number of institutions reporting a (positive) impact is found on dimensions like ‘improved customer impact’, ‘competitive position improved’, and ‘internal processes more efficient’. For this ‘high impact’ dimensions, close to half of the institutions report a positive influence as we would expect.

For the middle impact group, the dimensions like ‘coordination with suppliers’, staff productivity increased’, ‘sales increased’, ‘sales area widened’, and ‘procurement cost decreased’, only around a quarter of the institutions report a positive change. For this group of dimensions, it is surprising and even problematic that less than a quarter of the institutions report on an increase in staff productivity and increased sales. It seems clear that either we have a case of an exaggeration of benefits from e-business vendors or a case of Danish financial institutions being extraordinary poor at exploiting the opportunities.

For the low impact group as expected, the dimensions ‘procurement costs decreased’ and ‘inventory costs decreased’ has only been identified in a few institutions

Table 3: Impact of doing business on-line for Danish finance institutions

	Small Danish finance	Large Danish finance
Customer service improved	59.6	44.7
Competitive position improved	42.6	38.0
Internal processes more efficient	47.9	37.3
Coordination with suppliers improved	22.0	41.9
Staff productivity increased	18.7	26.8
Sales increased	33.3	10.6
Sales area widened	25.3	13.4
Procurement costs decreased	18.3	13.6
Inventory costs decreased	0.5	13.3
International sales increased	0.5	6.5

If we are comparing the difference in impact reported by the large and small Danish finance institutions, it is interesting to note that contrary to what one would expect, the overall picture is that it is a higher proportion of the small institutions which are reporting about a positive impact. And the difference is the largest on what we would identify as the most important dimensions (the first three in table 2 plus the dimension ‘sales increased’). This is even more interesting if we look at the global sample. Here it is evident that the general picture is that it is a higher number of

large institutions which are benefiting. We believe that this is a clear implication of the joint infra-structure in the Danish banking sector, where the smaller institutions are utilizing joint development and joint operations facilities.

If we look a little more in detail in the tables reported in appendices 2 and 3, we find the interesting result that the countries where the largest number of financial institutions is reporting huge benefits from doing business on-line are from the three developing countries of Brazil, Mexico and China. We believe that this is explained by the relative large change from old systems to doing business on-line.

This change has not been so dramatic neither in small nor in large Danish financial institutions. Accordingly, we would like to suggest that the key reason why only one third of Danish financial report on a large positive impact from doing business on-line is that Danish banks due to the high level of automation from the 70'ies constantly have been updating of their systems/business processes already before the introduction of Internet banking were fairly efficient. This is also corroborated by the fact that the technology deployment is very high in Danish financial institutions. Accordingly, the departure point for further rationalizations, increased staff productivity and increased (international) sales when introducing Internet-banking for customers on a large scale were not as high as for countries where the relative level of technology deployment and efficiency in business processes were at a much lower level.

8. CONCLUSION

The analysis above has dealt with Danish financial institutions in general (the quantitative data from the GEC survey including banks, insurance and mortgage institutions) and more specifically with the banking industry and two Danish banks, the Nordea Bank and Lån & Spar Bank.

The analysis showed that the Danish banking industry is fairly centralized compared to other countries (the two largest banks have approximately 75% of the market). The rest is shared among the almost unbelievable high number of 180 small banks. The existence of the many small banks is only possible because the banks outside top five share three banking centres for development and operations, and because of the joint infrastructure with ATM's, EFT, securities etc. is available for all Danish banks.

In the early days in the 60'es and 70'es banks were very much sheltered from competition and tightly regulated. This caused them to compete very early through the introduction of IT sometimes even act as guinea-pigs globally. The joint infrastructure also meant that Danish banks in general were more highly automated than almost anywhere else. One could say that in the late 80'ies and early 90'ies, Danish banks were state-of-the-art globally. Danish banks had perfected the business processes using the most advanced technology combined with a large distribution net of branches also equipped with the latest in technology.

When Internet came along, Danish banks in general were not very keen on jumping on-board the new technology. A few smaller banks like e.g. Lån & Spar were very active in pioneering the use of the technology for enhancing customer service and reducing operational costs. But the two

large banks, Danske Bank and Unibank (which later merged into Nordea) were hesitant to start cannibalizing their existing value chain and competing on unfamiliar turf. In that sense they were lagging behind large competitors like e.g. Merita-Nordbanken in Finland/Sweden. However, when the pure Internet banks gained ground in 1999/2000, policies were changed in the brick-and-mortar banks. After the merger of Unibank with Merita-Nordbanken to become the Nordea, the largest financial institution in the Nordic Countries, it has one of the largest numbers of Internet-customers anywhere with its 3.3 million customers on-line.

Danish banks and financial institutions are in the absolute top internationally, when it comes to the number of institutions having the technology. However, Danish finance institutions are only on par with the leaders internationally, when it comes to supporting customers in 'on-line service such as filling applications, filing claims, paying bills and transferring funds', 'access to account information' and 'the provision of on-line tools for research and planning'. Subsequently, Danish finance institutions are at most on par with the international sample when it comes to harvesting the benefits from being on-line. Here there are major challenges ahead e.g. in utilizing the right-channelling to customers, establishing 'what-you-see-is-what-I-see' in customer – bank clerk communication on each their screen, and in straight through processing including automatic credit scoring.

So even though some of the larger and even smaller institutions are world-class when it comes to sophistication and utilization of Internet and other on-line applications especially for customer self-service, there are a large number of financial institutions, who have not yet in a serious manner taken the necessary steps in on-line enabling their business.

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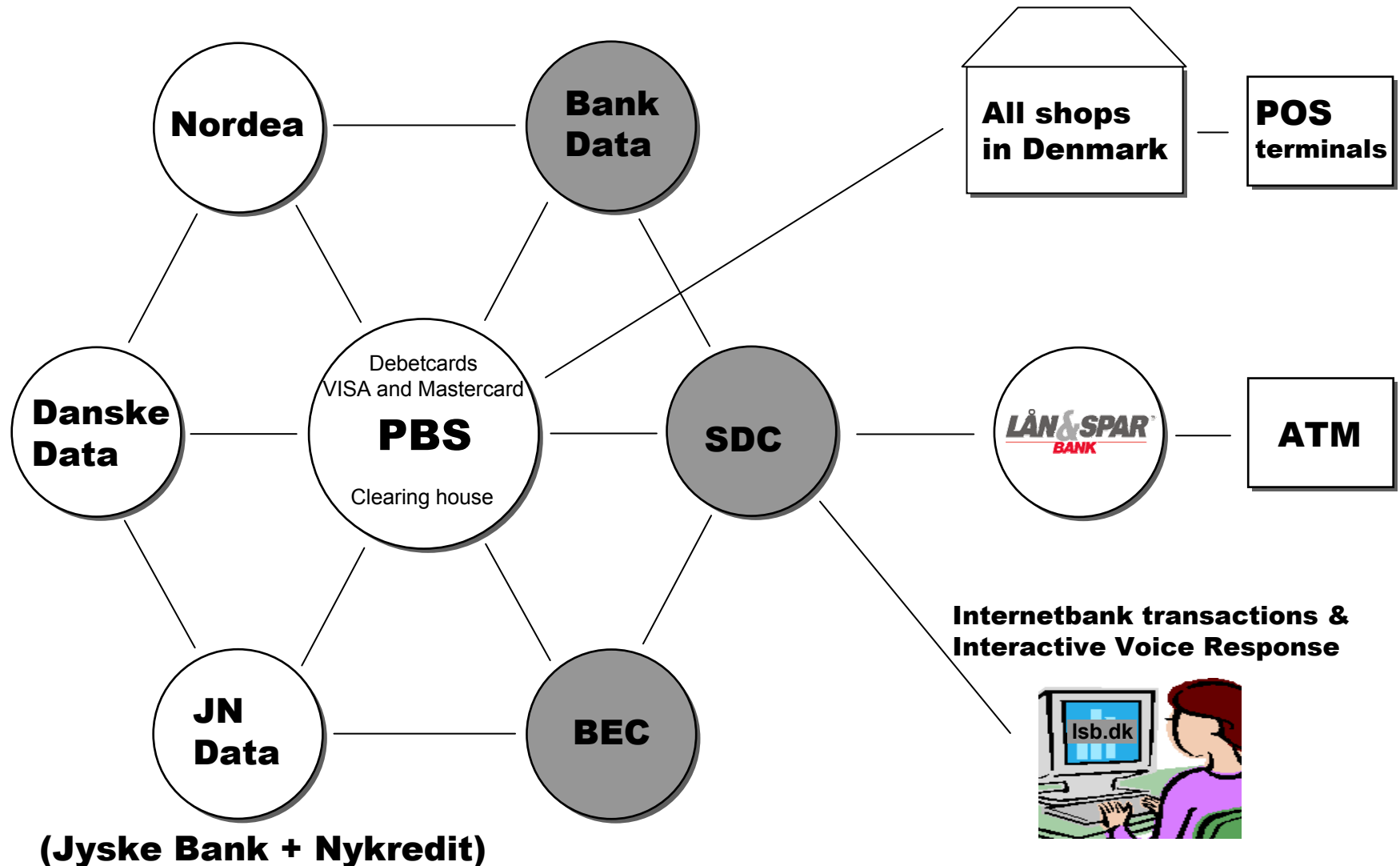
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The Danish Banking infrastructure illustrated with a small Danish bank, Lån & Spar - Foundation: UDUS and PI NET



Appendix 2

Small Finance Only: Impacts of Doing Business On-Line, 2002

	Americas			Europe			Asia				
Percent indicating high impact ^c	U.S. ^a	Mexico ^a	Brazil ^a	Denmark ^a	France ^a	Germany ^a	China ^a	Taiwan ^a	Singapore ^a	Japan ^a	Global ^b
Internal processes more efficient	35.9	33.4	57.2	47.9	23.1	22.7	44.4	26.1	38.8	21.0	33.3
Staff productivity increased	40.2	40.2	36.4	18.7	14.1	23.9	30.0	25.2	32.5	11.0	30.0
Sales increased	14.6	33.4	41.9	33.3	3.7	21.6	30.1	16.7	16.1	13.2	18.9
Sales area widened	34.0	20.2	40.4	25.3	22.4	31.7	42.3	33.2	26.3	11.9	30.5
Customer service improved	40.5	60.3	41.6	59.6	21.8	50.9	42.6	41.0	33.6	6.7	39.1
International sales increased	8.1	19.7	11.1	0.5	9.2	1.1	26.1	16.7	10.2	0.0	9.2
Procurement costs decreased	18.1	20.0	28.4	18.3	5.1	1.1	17.1	24.5	15.0	0.6	13.9
Inventory costs decreased	19.5	7.2	21.7	0.5	6.8	1.2	20.9	8.5	22.2	5.3	13.1
Coordination with suppliers improved	33.6	39.8	32.1	22.0	25.0	19.3	15.1	0.7	22.2	10.8	24.9
Competitive position improved	28.8	40.0	33.0	42.6	10.4	36.3	45.8	26.3	29.6	5.6	28.9

Notes: ^a Responses were weighted based on the total number of establishments by employee size within the small finance sector for each country. Survey sample sizes by country with weighted size in parentheses: U.S 52 (39,980), Mexico 30 (4,180), Brazil 30 (3,262), Denmark 32 (4,888), France 36 (10,155), Germany 35 (11,814), China 33 (10,884), Taiwan 34 (4,358), Singapore 37 (759), and Japan 46 (8,898).

^b Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China and Japan. "Global" sample for small finance sector is 365 (weighted=99,178).

^c Exact wording of question: Using a 5-point scale where 5 is "a great deal" and 1 is "not at all", please rate the degree to which your establishment has experienced the following impacts since it began using the Internet for business. A score of 4 or 5 was classified as "high impact".

Source: CRITO Global E-Commerce Survey, 2002

Appendix 3

Large Finance Only: Impacts of Doing Business On-Line, 2002

	Americas			Europe			Asia				
Percent indicating high impact ^c	U.S. ^a	Mexico ^a	Brazil ^a	Denmark ^a	France ^a	Germany ^a	China ^a	Taiwan ^a	Singapore ^a	Japan ^a	Global ^b
Internal processes more efficient	42.1	53.7	52.6	37.3	27.8	24.4	41.0	44.1	48.3	16.2	39.4
Staff productivity increased	24.1	39.8	38.3	26.8	14.9	13.0	28.3	27.5	48.3	20.2	25.2
Sales increased	24.9	45.5	24.0	10.6	1.9	14.3	33.5	25.0	48.3	19.3	26.4
Sales area widened	41.6	27.1	20.8	13.4	9.8	9.6	30.9	37.7	57.1	18.5	33.7
Customer service improved	45.9	61.0	59.1	44.7	35.1	49.6	52.5	50.5	69.0	10.8	46.3
International sales increased	5.9	17.4	5.3	6.5	0.0	3.3	13.8	11.3	51.9	0.0	8.3
Procurement costs decreased	15.4	35.6	14.1	13.6	4.5	11.1	11.8	11.3	38.5	4.0	13.4
Inventory costs decreased	8.2	16.5	11.4	13.3	5.3	19.3	12.1	12.7	25.0	0.0	9.5
Coordination with suppliers improved	31.6	43.2	29.5	41.9	11.5	27.9	29.0	24.0	37.0	4.2	28.3
Competitive position improved	57.0	53.7	48.1	38.0	12.4	35.9	59.9	48.0	75.0	14.5	52.4

Notes: ^a Responses were weighted based on the total number of establishments by employee size within the large finance sector for each country. Survey sample sizes by country with weighted size in parentheses: U.S 48 (4,378), Mexico 33 (123), Brazil 34 (154), Denmark 32 (80), France 33 (455), Germany 33 (279), China 34 (2,913), Taiwan 33 (204), Singapore 30 (60), and Japan 20 (519).

^b Consists of weighted survey responses in 10 countries combined: United States, Mexico, Brazil, Germany, France, Denmark, Singapore, Taiwan, China and Japan. "Global" sample for large, finance sector is 330 (weighted=9,165).

^c Exact wording of question: Using a 5-point scale where 5 is "a great deal" and 1 is "not at all", please rate the degree to which your establishment has experienced the following impacts since it began using the Internet for business. A score of 4 or 5 was classified as "high impact".

Source: CRITO Global E-Commerce Survey, 2002